

We Claim:

1. An architecture for an intelligent agent comprising:
 - a messaging facility for handling incoming and outgoing messages;
 - an expert system for evaluating rules and maintaining known facts;
 - a sensory facility for sensing conditions external to said intelligent agent; and
 - a means for communication between said messaging facility, said expert system and said sensory facility.
2. The architecture of claim 1 wherein said means for communication comprises an event bus upon which events are published and from which said messaging facility, said expert system and said sensory facility can receive events.
3. The architecture of claim 2 wherein said messaging facility further comprises an interpreter for decoding incoming messages.
4. The architecture of claim 3 wherein said interpreter is aware of a domain-specific ontology.
5. The architecture of claim 4 wherein said interpreter may publish an event on said event bus in response to a decoded message.
6. The architecture of claim 2 wherein said messaging facility verifies and directs outgoing messages.
7. The architecture of claim 2 wherein said expert system further comprises:
 - a reasoning facility for storing and evaluating rules; and
 - a beliefs storage facility wherein known facts are stored.
8. The architecture of claim 7 wherein said known facts stored in said beliefs storage facility originate from a sensory input from said sensory facility.

9. The architecture of claim 7 wherein said known facts stored in said beliefs storage facility originate from a message received by said messaging facility.
10. The architecture of claim 7 wherein said known facts stored in said beliefs storage facility originate from an evaluation of a rule by said reasoning facility.
11. The architecture of claim 8 wherein said sensory facility publishes an event on said event bus noting a change external to said agent when such a change is detected.
12. The architecture of claim 11 wherein said event published by said sensory layer is received by said expert system said external change is stored in said beliefs storage facility.
13. The architecture of claim 7 wherein a change in said beliefs storage facility triggers a re-evaluation of said rules by said reasoning facility.
14. The architecture of claim 2 further comprising an action facility for carrying out actions required by said agent.
15. The architecture of claim 14 wherein said actions result from a re-evaluation of said rules by said reasoning facility.
16. The architecture of claim 14 wherein said actions result from an external condition sensed by said sensory facility.
17. The architecture of claim 7 further comprising a logic engine component to aid said reasoning facility in the evaluation of rules.
18. The architecture of claim 17 wherein said logic engine is aware of a domain-specific ontology.

19. The architecture of claim 18 wherein said logic engine is further aware of a set of axioms describing said domain.

20. The architecture of claim 19 wherein said logic engine has a constraint satisfaction capability.

21. The architecture of claim 20 wherein said logic engine enables said agent to learn optimal ways of solving certain problems or performing certain actions

22. The architecture of claim 21 wherein said logic engine learns via a decision tree.

23. The architecture of claim 21 wherein said logic engine learns via a neural network.

24. The architecture of claim 21 wherein said logic engine learns via reinforcement learning.

25. A society of intelligent agents comprising:

one or more agent hosts for executing agents;

a facilitator for enabling entities external to said society to communicate with and discover information regarding entities within said society; and

a database containing information regarding all agents running in said society.

26. The society of claim 25 wherein all entities with said society are able to communicate via a communications network.

27. The society of claim 26 wherein said communications network is the Internet.

28. The society of claim 25 wherein said each of said agent hosts can host a plurality of said agents.

29. The society of claim 28 wherein each of said agent hosts further comprises a message dispatcher for routing messages to all of said agents hosted by that agent host.
30. The society of claim 25 wherein said database further comprises a white pages directory containing information necessary to identify, locate and send messages to a particular agent within the society.
31. The society of claim 30 wherein said database further comprises a yellow pages directory containing information regarding services available to agents running within the society.
32. The society of claim 25 further comprising a workflow manager for managing the execution of multi-step tasks.
33. The society of claim 32 wherein said workflow manager is capable of parsing multi-step task definitions and organizing the sequence of said steps necessary to complete the task described by said multi-step task definition.
34. The society of claim 33 wherein said workflow manager may use task agents to complete one or more of said steps of said task.
35. The society of claim 34 wherein said workflow manager can execute said steps of said task in parallel when appropriate.
36. The society of claim 35 wherein said workflow manager further comprises a task definition repository for storing said multi-step task definitions.
37. The society of claim 25 wherein said facilitator includes an agent activator responsible for instantiating agents.

38. The society of claim 37 wherein said agent activator is able to recover agents and their context which are no longer running due to software or hardware faults within said society.
39. The society of claim 37 wherein agents are activated by placing them in a distributed memory area accessible to all entities within said society.
40. The society of claim 39 wherein any one of said plurality of agent hosts within said society may remove an agent from said distributed memory and run said agent.
41. A society of intelligent agents comprising:
- one or more agent hosts for executing agents;
 - a facilitator for enabling entities external to said society to communicate with and discover information regarding entities within said society; and
 - a database containing information regarding all agents running in said society;
- wherein said intelligent agents comprise:
- a messaging facility for handling incoming and outgoing messages;
 - an expert system for evaluating rules and maintaining known facts;
 - a sensory facility for sensing conditions external to said intelligent agent; and
 - a means for communication between said messaging facility, said expert system and said sensory facility.
42. The society of claim 41 wherein said society further comprises a workflow manager for managing the execution of multi-step tasks.
43. The society of claim 41 wherein said agents further comprise an action facility for carrying out actions required by said agent.